Overview on Ewaste Management in India

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ABSTRACT

E-waste management in India presents a pressing environmental and health challenge. The rapid proliferation of electronic devices has led to a substantial increase in electronic waste (e-waste) generation. This e-waste contains hazardous materials, such as lead and mercury, making proper disposal crucial. India has taken steps to address this issue through the implementation of the E-Waste (Management and Handling) Rules in 2016. Despite these regulations, informal e-waste recycling and disposal practices persist, leading to health hazards for workers and environmental pollution. India is gradually enhancing its e-waste infrastructure, promoting recycling, and raising awareness among consumers about responsible disposal methods

.Furthermore, innovative strategies like extended producer responsibility (EPR) are being explored to hold manufacturers accountable for their products throughout their lifecycle. As India continues its economic growth, effective e-waste management is essential to mitigate environmental harm and promote a sustainable circular economy.

1. Introduction

Electronic waste, commonly referred to as e-waste, has become a paramount concern within the Indian context. With the rapid technological advancement and the increasing prevalence of electronic devices, the country is grappling with a mounting e-waste predicament. E-waste encompasses discarded electronic and electrical equipment, often laden with hazardous materials like lead, mercury, and cadmium. The surge in e-waste generation has raised significant environmental, social, and economic challenges, necessitating comprehensive strategies for its responsible disposal and recycling.

This overview endeavours to provide an insightful exploration of the multifaceted dimensions of e-waste management in India. It seeks to delve into the far-reaching implications of unregulated e-waste proliferation, shedding light on the government's regulatory measures and initiatives aimed at addressing this pressing issue. Additionally, it will scrutinize the hurdles faced in the effective implementation of e-waste management practices, while also showcasing innovative approaches and emerging trends in this dynamic field.

The management of e-waste not only poses an environmental imperative but also presents a noteworthy opportunity for fostering sustainable development and embracing circular economy principles within India. This overview aspires to offer a comprehensive understanding of the present state of e-waste management in the country, along with the concerted efforts being made to combat this formidable challenge.

2. Literature Survey

The main problem of this study is electronic waste (ewaste), which has become a new
problem in the 21st century. The rapid growth of the electronics and information technology industry, giftoriented consumer culture and increasing use of electronic products have become dangerous for the environment. Ewaste also poses a risk during recycling because many materials contain carcinogens and toxins. Its effects and toxicity are dueto emissions of lead, mercury, cadmium, metallic elements and toxic substances. Developing countries freely send these wastes to developing countries. China and some Asian countries with low environmental standards are the most important recipients of ewaste, which is often disposed of illegally. The environmental burden of ewaste is due to insomnia in developing countries. Although there are many laws and guidelines in developing countries, the management of ewaste is still not manageable. Current research focuses on the impact of materials, business and use on the natural environment.

3. Classification of E-waste

Table 3.1 E-waste Categories

Category	Description	Examples
Hazardous E-waste	Contain hazardous materials .	CRT monitors, Fluorescent lamps
Non-hazardous E-waste	Lacks of hazardous materials.	Computers, Prienters, Mobile phones

E-waste is categorized into two distinct classes:

Hazardous E-waste: This classification encompasses electronic and electrical equipment that contains hazardous materials such as lead, mercury, cadmium, and certain flame retardants. These components pose environmental and health risks if not managed and disposed of properly. Examples include cathode-ray tube (CRT) monitors and fluorescent lamps.

Non-Hazardous E-waste: This category includes electronic and electrical equipment that lacks hazardous materials, making them less harmful to the environment and human health. Common examples encompass computers, printers, and mobile phones.

These classifications are essential for guiding the appropriate recycling, disposal, and management of e-waste.

Table 3.1. Possible Hazardous Substances in Components of E-waste

Component	Possible hazardous content
Metal	
Cooling	Ozone Depleting Substance (ODS)
Plastic	Phthalate plasticizer, brominated flame retarsants(BFR)
Insulation	Asbestos, refractory ceramic fiber
Glass	
Cathod Ray Tube	Lead, Antimony, Mercury, Phospor
Liquid Crystal Display	Mercury
Rubber	Phthalate plasticizer , BFR
Wiring	Phthalate plasticizer , BFR, lead

Source (Vol 9 Issue 11, Nov-2020)

4. Sources of E-waste

Source of e-waste in India. E-waste has been introduced in the country by various sources such as the government. The country's sectors are business, corporate sector, R&D, family and manufacturing sectors.

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                    │     Sources of  E-waste      │
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  ┌──────────┐  ┌──────────┐  ┌──────────────┐  ┌──────────┐
  │   Home   │  │ Hospital │  │  Government  │  │ Private  │
  │          │  │          │  │              │  │  Sector  │
  └──────────┘  └──────────┘  └──────────────┘  └──────────┘
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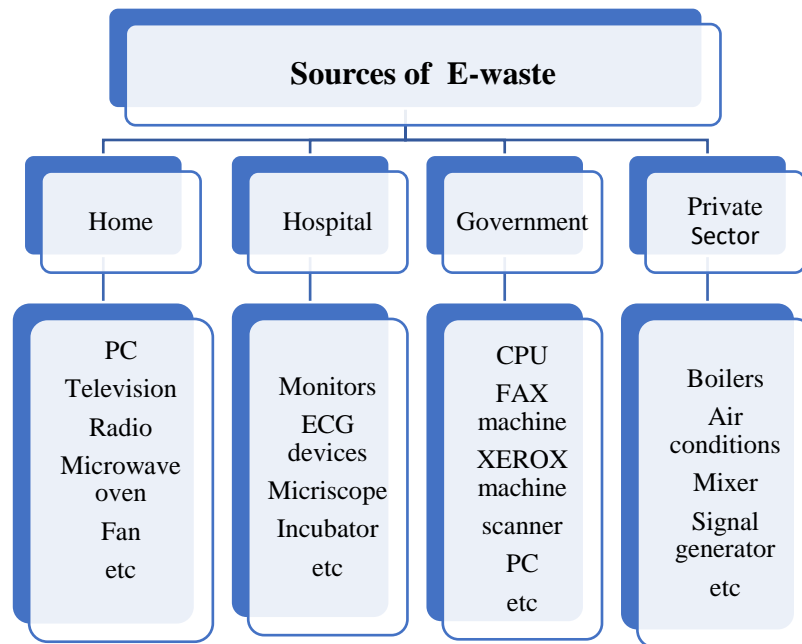| Home	Hospital	Government	Private Sector
PC Television Radio Microwave oven Fan etc	Monitors ECG devices Micriscope Incubator etc	CPU FAX machine XEROX machine scanner PC etc	Boilers Air conditions Mixer Signal generator etc

Figure 1. Block diagram of e-commerce in India. Source: (UNEP, DTIE, 2007)

- Refers to computers in individual homes and small businesses; It is difficult to know the number. A family in India is not a big supporter. They account for 22% of all computers in India. The remaining balance (78%) comes from commercial activities.

- Large companies, organizations, government agencies and foreign embassies are early users of electronic devices; today they account for 78% of all personal installations. Therefore, they are India's largest technology manufacturers. It was determined that the total number of computers disposed of in workplaces and homes was approximately 1.38 million.

- PC manufacturers and retailers continue to contribute to the e-waste segment in India. The company's waste products include integrated circuit boards, motherboards, 4 cathode ray tubes and other peripherals produced during production. It also includes computers not purchased by replacement customers. It is estimated that the sector produces approximately 1050 tons of waste annually.

- Imported e-waste is the largest source of imported PC waste. Many electronic products such as monitors, printers, keyboards, CPUs, projectors, mobile phones, PVC wires are imported. Computers come in all sizes, shapes and sizes, with accessories and accessories. • Secondary waste includes TVs, computers, mobile phones and electronics.

5. Research Methodology

The research approach adopted in this article is based on qualitative analysis of environmental and social aspects of e-waste. Since there is not enough information about e-waste, the research method was adopted. There are articles on the subject in various important public and non-governmental organizations, research articles, news, websites, etc. Collecting data by analyzing published qualitative data.

6. E-waste Managemant in INDIA

India is the world's fifth largest producer of e-products; In 2014, 1.7 million tons of electrical and electronic products were thrown away (Economic Times, 2015). In India, e-waste, transportation, segregation, destruction, recycling and disposal are done manually by illegal workers in illegal industries. Due to lack of knowledge and understanding, e-waste is as dangerous as garbage collected and sorted from landfills. E-waste contains valuable materials that can be reused. Scavengers make a living by selling this e-waste to dealers. Waste vendors offer e-waste to the recycling industry. Recyclers use old and hazardous technologies and equipment to recycle/process waste (Gupta and Kumar, 2014). India produces approximately 1.25 million tonnes of e-liquid every year (ASSOCHAM, 2014). India ranks 155th out of 178 countries in the Environmental Performance Index. It also ranks poorly on several indicators, including 127th for health hazards, 174th for air quality, and 124th for water and sanitation (EPI, 2014). Environmentally sound management (ESM) of e-waste will also improve India's ranking in these areas. India was used as an e-waste storage area by many developed countries.

Figure 2. Shows the percentage of e-waste imported into India from different countries.
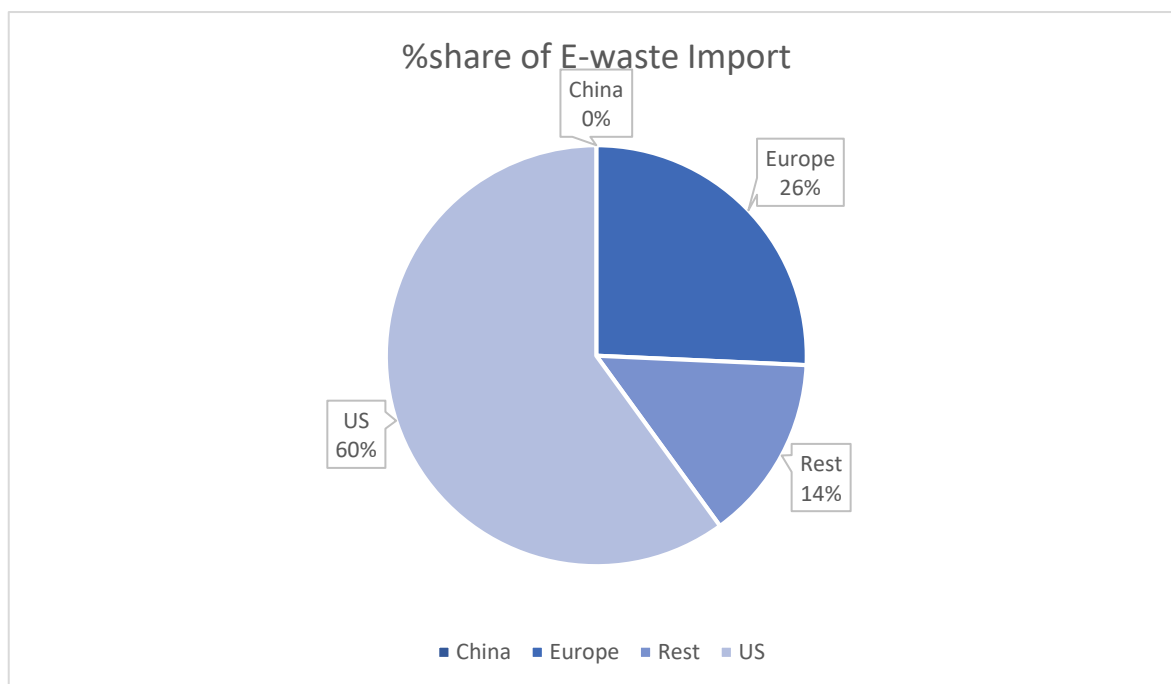
Source - (Economic Times, 2015).

Looking at the country's share in India's e-commerce imports, the US has the largest share at around 42%, followed by China at 30%, followed by Europe at around 18% and other countries at 10%. Like Taiwan and South Korea. Japan etc .

Table 6.1. E-waste generation in India.

Sr. No.	State	E-waste Generated in MTA	Metropolitan Cities and others	E-waste Generated in MTA
1	Maharastra	20270.59	Mumbai	11017.1
2	Tamil Nadu	13486.24	Delhi	9729.15
3	Andra Pradesh	12780.33	Bengaluru	4648.4
4	Uttar Pradesh	10381.11	Chennai	4132.2
5	West Bengal	10059.36	Kolkata	4025.3
6	Delhi	9729.15	Ahmadabad	3287.5
7	Karnataka	9118.74	Hyderabad	2833.5
8	Gujarat	8994.33	Pune	2584.2
9	Madhya Pradesh	7800.62	Surat	1836.5
10	Punjab	6958.46	Nagpur	1768.9

Table 6.1 shows the 10 states and cities that generate the most e-waste in India. 70% of the country's e-waste is generated in 10 states and 60% in 65 cities (Rajya Sabha, 2011). The growth of e-waste in India is high because it accounts for 18% 10% 42% 30% of e-waste Europe Other countries United States China.

 Due to the huge importance of IT and the use of electronic products. Years of modernization in the last 60 years; However, the lack of a good waste system in our country causes the generation of large amounts of e-waste. Since e-waste is not collected separately, there is currently no reliable data to measure the cost of e-waste. In India, most of the operations related to e-products such as collection, classification, destruction, recycling and disposal are done manually. Most of the technologies used for e-waste recycling/processing are critical and dangerous due to the lack of appropriate tools and equipment.

7. Challenges of E-waste Concern

- Awareness of producers and consumers about the dangers of disposing of e-waste is low.

- There is no accurate estimate of the cost of ewaste generation and reycling in India.

- Most of the ewaste is processed through unofficial (unorganized) activities using simple methods such as acid leaching and open burning, causing serious damage to the environment.

- People dealing with e-waste have little or no knowledge about toxins in e-waste and face health problems.

- Reemployment after high risk affects vulnerable groups such as women, children and migrant workers.

- Inefficient recovery processes can result in significant loss of assets and resources.

- Recycled materials select precious metals (gold, platinum, silver, copper, etc.) without harming the environment and discarding residual metals.

- There is no law on e-waste management.

8. Extended Producer Responsibility Guidlines

- Extended Producer Responsibility (EPR) is the responsibility of all electrical and electronic equipment (EEE) manufacturers to collect e-waste from end-of-life products and transport it to authorized dismantling/recycling centres.

- Producers can use their EPR through recycling processes and/or build storage facilities, or both, transporting e-waste from end-of-life to authorized dismantlers/recyclers

- Producers must have a dismantling/recycling permit Individually or collectively as defined in the EPR plan approved by the Central Pollution Control Board (CPCB) in the manufacturer's EPR approved in the permit or through the Responsible Construction Organization Study. • EPR authorization is mandatory and all manufacturers (such as distributors, e-retailers / online sellers / e-bay etc.) must obtain authorization for EEEs listed in Schedule – I of the E-Learning (Management) Act 2016.

- A manufacturer that sells or places electrical and electronic products on the market without an EPR permit should be considered to harm the environment. Producers who do not have an EPR permit should be subject to action in accordance with the provisions of the Environmental Production Act 1986.

9. Conclusion

In fact, e-waste production is increasing due to the lack of electrical and electronic equipment (EEE). People can keep the waste at home or sell it to local collectors to generate income. Currently, there is no appropriate law for e-waste management. Accordingly, there is no e-waste mechanism in many places. Due to lack of knowledge and understanding, e-waste is transported, identified, removed, recycled and disposed of manually through illegal activities. The use of electrical and electronic equipment (EEE) is increasing in order to bridge the digital divide and therefore, if ICT waste is not disposed of, it can have negative impacts on the environment and human health. Recently, the legislation on the use of waste energy has been completed on time, but no progress has been made. Therefore, in order to control the increase in e-waste in the future, it is necessary to raise awareness about e-waste and comply with the rules. To create a healthy e-liquid waste for consumption, it is necessary to create the necessary information from existing procedures that meet standard procedures and rules and international standards and practices.

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